

# TENDER ENQUIRY NO. CAER/UPES/R&D/01/2010-11

## GENERAL GUIDELINES FOR THE VENDOR

1. Bids/offers are requested for the subject items complete in accordance with our enquiry document attachments under **Two Bid System**.

### **Definition of Two Bid System:-**

The bidder should be a reputed Electrolyzer manufacturing company and experienced in installation of the same. The quotation shall comprise of two priced and two unpriced copies each of the four in separate sealed envelopes duly super scribed and all these envelopes should be enclosed in a common sealed envelope. The priced, unpriced and the common sealed envelope shall be super scribed with our tender enquiry number, due date, item and name & address of the bidder captioned above. The priced & unpriced quotations shall be identical in all respects excepting that the unpriced quotation shall keep the price blank and only the priced quotation shall contain the price.

- a) The price bid should contain only the detailed FCA(Free Carrier) / FOB(Freight on Board) price, break-up with estimated insurance, air freight / sea freight charges and FCA / FOB charges of the items offered including discount, if any and must bear on top, the word “price quotation” and also reference No. and the date of opening of the tender. The unpriced offers shall be opened in public on the due date and priced offers of only those tenders whose unpriced offers are found technically suitable shall be opened subsequently for which intimation shall be given to vendors. **Quotation received through Fax or E-mail will not be accepted.**
  - b) **The unpriced bid shall be exact replica of the price bid except that all places where prices are indicated in the priced bid will be marked as “Quoted” in the unpriced bid.** In addition, it shall also contain all particulars regarding specifications, delivery schedule, payment terms and all other commercial terms excluding price along with technical literature and must bear on top the word technical / unpriced offer. The Earnest Money Deposited must be kept in this envelope only.
2. Bids complete in all respects, enclosing the attachments, should reach our office on or before **20/02/2012 by 1430 HRS (IST). The unpriced bids shall be opened on the same day i.e. 20/02/2012 at 1500 HRS (IST) in our office.** The price bids of technically and commercially accepted offers shall be opened separately under due intimation to techno- commercially qualified bidders only.
  3. Foreign Manufactures should indicate the FOB price & CIF price to New Delhi (airport)/ Tugalkabad (Dry port) separately in their offers.
  4. The technical specification should be as per specification sheet enclosed as **Annexure -I**. In case of any deviation, please spell them out in your bid under the heading “Deviations to Technical Specifications”.
  5. The commercial requirements are specified in the enclosed Agree Terms & Conditions (**Annexure -II**), which should be duly filled in, signed & stamped on all pages. The same

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should be returned to us along with your unpriced bids. Bids received without duly filled in questionnaire are liable to be rejected.

6. The validity of the offer should be for a minimum period of Six (6) months from the closing date of this enquiry. However, in case we require further validity extension due to some unforeseen conditions, the same should be extended at the same price, terms & conditions as quoted in the original offers.
7. In case of any delays in supply or installation at the site, price reduction will be as per the UPES norms (As in (6) Annexure II).
8. Any effort by bidder, consultant or representative, however described, to influence the owner in any way concerning scrutiny/ consideration/ evaluation/ comparison of the bid or decision concerning the award of the contract shall entail rejection of the bid.
9. **In case the Indian Counterpart of the foreign manufacturer submits offer on their letter head on behalf of the foreign manufacturer in foreign currency, such offer should essentially contain the specific authorization of the foreign manufacturer authorizing their behalf and will execute the order in line with the prices, terms & conditions agreed by the Indian counterpart.**  
**Bidders to note that offers received from Indian Counterparts in Indian Rupees for the products manufactured by their foreign principal abroad (even with authorization letter from foreign principal to quote & execute orders in Indian Rupees for their products manufactured abroad) will be rejected out rightly and no further opportunity will be extended for revising such offers.**
10. UPES reserves the right to accept or reject any tender in part or full without assigning any reason whatsoever. UPES also reserves its right not to accept the lowest rates quoted by the tenderers and also to split the order as per our requirement.
11. “The bidders to
  - i. Confirm that their company is not engaging child labor and is complying with various legislations as applicable from time to time as per the various labor laws/ statutes of the land applicable to them with regard to engagement of child labor.
  - ii. Confirm Unconditional acceptance that any bidder making a false claim would have its contract terminated forthwith, if detected later.”
12. UPES will not be responsible for delay, loss or non- receipt of tender documents sent by the post.
13. **Negotiations will not be conducted with the bidders as a matter of routine. However, UPES reserves the right to conduct negotiations.**
14. Jurisdiction for all disputes related to this tender shall be at New Delhi Court.

**Following Documents are to be returned/ enclosed with the technical bid:-**

Agreed Terms & Conditions enclosed as **Annexure -II** below, duly filled/ commented on each point, signed & stamped on each page.

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## Important Notes

1. Vendor may be put on **the “holiday list”** in case:
  - a) The tender is accepted and the tender fails to furnish the Performance Bank Guarantee or to execute the contracts within the stipulated period.
  - b) In case the tender alters/ modifies/ withdraws the bids suo-moto after opening the bids (technical bids in case of two bids system) and within the validity period. In such a case, the tender submitted by the tenderer shall be liable to be rejected.
2. Please note that the tender can be abandoned without assigning any reason and in such case, no compensation will be paid for the efforts made by the bidders.
3. In case of composite jobs where site activities are involved, two separate contracts to be issued, one for supply of material and another for execution of the site work. However, both the contracts will be inter-linked for the purpose of liabilities and performance of the vendor.
4. Cutting and corrections in the bid document should be avoided and if it is unavoidable, it should be kept at the bare minimum and it should be neatly cut and re-written without over-writing and use of white fluid. All corrections should be duly signed by the tenderer. In case the tenderers resorting to many corrections including usage of white fluid in tender document, the tender shall be liable for rejection.
5. Bidders to quote competitive prices considering the fact that price negotiations, if required, will be held with the lowest technically commercially acceptable tenderer only. UPES has the right to reject the offer(s) in case tenderer(s) give suo moto increase and not to consider suo moto reduction for evaluation.
6. The un-priced bid of offers shall be opened in presence of the authorized representatives of intending tenderers on the date and time as mentioned above.
7. Tender/s received after the prescribed due date and time shall be rejected summarily.
8. The offer must accompany the Safety Data Sheet/ Catalogue, etc. (as the case may be) in respect of the product offered.

**TENDER DOCUMENT****Establishment & Demonstration of Hydrogen Production and Utilization Facility through Photovoltaic-Electrolyzers system at the Solar Energy Centre (SEC) GwalPahari , Gurgaon.****General Description**

University of Petroleum and Energy Studies (UPES) intends to set up a Hydrogen dispensing station on behest of Ministry of New & Renewable Energy at its Solar Energy Centre, Gwalapahari, Gurgaon. The electrical supply to this station will be sourced through PV systems which will be supplemented through grid supply. The purpose of creating a hydrogen dispensing facility at this location is to dispense pure hydrogen for hydrogen ICE powered vehicles and fuel cell vehicles. The proposed facility will have onsite hydrogen generation, compression, storage unit and dispensing unit, which can dispense hydrogen at 350 bar to the vehicles.

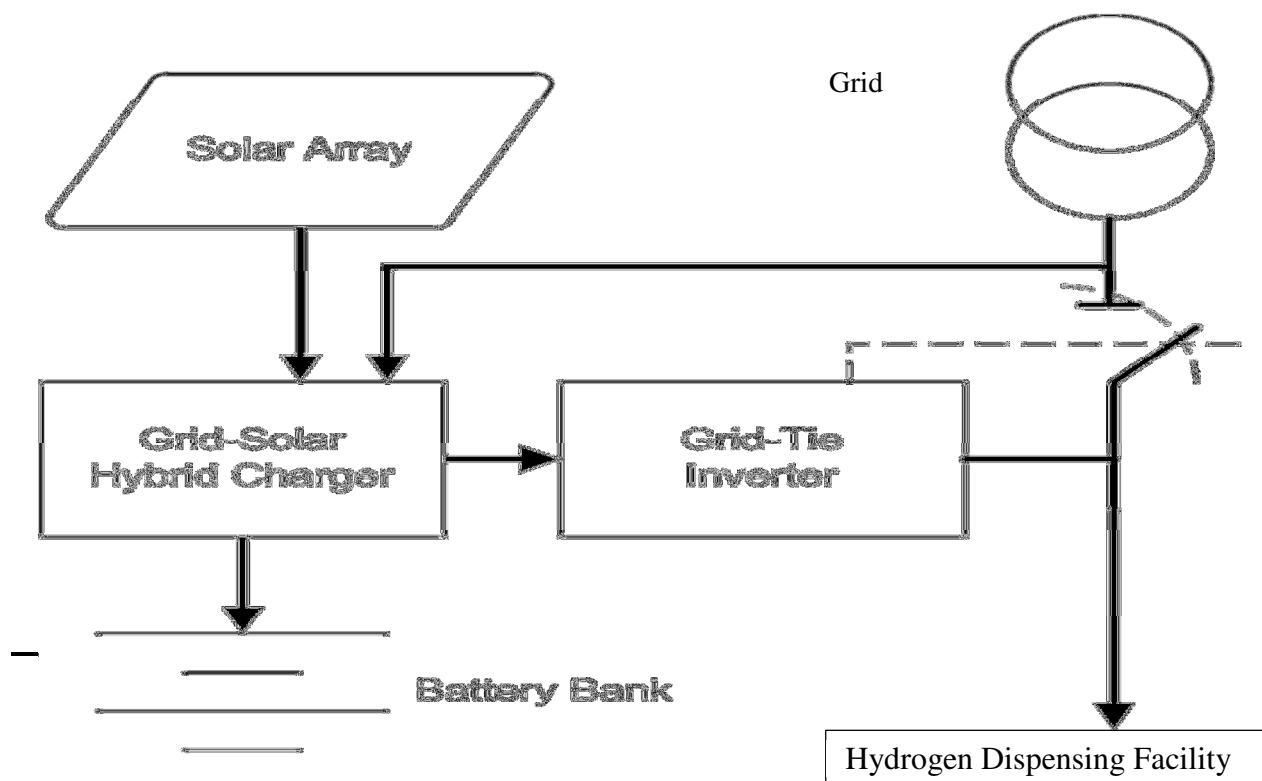


Fig 1- General block diagram of power supply

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The fig 1 depicts the configuration of the Solar PV system which will be used for generating power to Hydrogen Dispensing Station.

### 1.0 Tender Qualification

The complete hydrogen dispensing station is to be set up on turnkey basis and the vendor should have experience of setting up of at least 2 similar facilities comprising of electrolyzer, compressor, dispenser, associated electrical and instrumentation control system and related accessories during last five years. Vendor should provide the details of the similar facilities set up during the period supported by technical documents and list of users with contact details. Vendor should have their Service Centre / operation in India, with sufficient spares and trained manpower for after sales service.

The detailed specifications of the complete system are given below.

### 2.0 Hydrogen Generation Plant Using Electrolysis of Water: 1 No.

- |   |   |                          |
|---|---|--------------------------|
| a) Type                                   | : | Electrolytic (KOH based) |
| b) Hydrogen gas generation capacity (Min) | : | 5 Nm <sup>3</sup> / hr   |
| c) Max. Oxygen impurity in Hydrogen       | : | 2 ppm                    |
| d) Delivery Pressure                      | : | 7-12 bar                 |
| e) Location temperature                   | : | 0°C to 50°C              |
| f) Purity of Hydrogen                     | : | 99.999 %                 |
- g) Bipolar sealed compact design.
- h) Microprocessor based control for fully automatic operation and integrated safety controls.
- i) Electrical Distribution System with appropriate voltage regulating system.
- j) Treatment system of water to make it suitable for use in the Electrolyzer (section 2.1c).
- k) Suitable analyzer system for continuous display of hydrogen purity dispensed in percent, oxygen content (ppm) and dew point in degree C.

The unit should be fully automatic, suitable for unattended operation and laid out in a manner so as to conform to national / international standards applicable to hydrogen dispensing stations.

#### 2.1 Other facilities to be provided along with the hydrogen generation plant to meet the above specifications:

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- a) Deoxo-dryer for Oxygen removal.
- b) Hydrogen Gas - electrolyte separator, hydrogen gas cooler, hydrogen demister, and drier for moisture removal.
- c) Water treatment plant - DM water plant with automatic regeneration facilities (supply water conductivity should be max 5 micro seimens / cm). Raw water analysis report will be provided by UPES.
- d) Common air-cooled chiller in order to reduce hydrogen losses in the regeneration process of the deoxo-dryer and cooling required for electrolyzer & compressor etc.
  - Chiller should have all internal piping, external piping & storage vessel / tank of SS material.
  - Closed – loop cooling with chiller should be provided.
- e) Wiring of control cabling between control panel and electrolyzer to be provided.
- f) Wiring of power cabling between electrolyzer and electrolyzer power supply to be included.

### **2.2 All necessary equipment for automatic operation of the Hydrogen plant:**

#### **2.2.1 Process Instrumentation**

- a) The unit should be equipped for automatic operation with necessary instrumentation such as transmitters, indicators, switches, detectors, solenoid valves, manual valves, relief & check valves, pipe work and SS fittings, hard wired signals on all critical parameters, explosion proof junction box etc., electrical control panel and cables.
- b) All the electrical & instrumentation components must conform to hazardous area classification Gas Group IIC (hydrogen gas).

#### **2.2.2 Electrolyzer Power Supply**

- a) Metal enclosure with doors for easy accessibility and with supports for the electrical components like transformer, rectifier and set of SCR's to be provided.
- b) Complete automatic independent unit designed to rectify the AC power to the necessary DC power.
- c) Integrated current regulation for smooth and fast reaction times of the hydrogen generator.
- d) The unit should be either in flameproof enclosure (Gas Group IIC) or to be located in safe area.

### **2.2.3 Electrical Control Panel:**

- a) Microprocessor controlled board
- b) Human Machine Interface (HMI) with system start-up/ shut down, alarm system, parameter setting, status indication and event logging.
- c) Audio and visible alarm on man machine interface
- d) Emergency shutdown button
- e) General alarm / ready contact
- f) Uninterrupted power supply: The Inverter of suitable capacity (minimum 20 KVA) to maintain all critical parameters of the system during power failure. Inverter is specially required for the control panel of electrolyzer. In case of power failure, the hydrogen production should be stopped immediately and the unit should be put in stand- by mode. If the power supply is not restored within 5 hours, the remaining power of the battery should allow the microprocessor to depressurize the system and put all parameters into a safe position.

### **2.3 Safety Requirement**

- a) The equipment will be built according to the international standards and should fulfill the necessary requirements towards pressure vessel directives and hazardous area classification vis-à-vis inter equipment distances / clearances for installation and selection of equipment conforming to latest international standards & prevalent Indian norms.
- b) The complete process, together with all relevant parameters, should be constantly monitored and controlled by microprocessor(s). Each action that might cause a dangerous situation should be by-passed by a hard wired safety system. In case of malfunction of the microprocessor(s) or in an emergency situation, the unit should shut down immediately.
- c) Hydrogen in the atmosphere should be constantly checked using suitable hydrogen leak detectors and if hydrogen in the atmosphere is detected at a level of 20% of Lower explosion level (LEL) for hydrogen, the unit should immediately stop production and put itself in standby.
- d) Vendor should provide the appropriate hydrogen sensors, heat sensors, smoke detectors etc. at suitable location(s).
- e) Pressure transmitter should constantly monitor and control the system pressure. If the system pressure increases out of range, the production should be stopped

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and put in standby. A temperature transmitter should constantly monitor and control the electrolyte temperature. The electrolyte levels should be measured by a level transmitter and controlled by a level controller.

- f) Safety devices to protect microprocessor(s) against power line disturbance should be provided. The system should be capable of taking electrical surges and wide voltage fluctuations.

### List of Preferable Manufacturers For Major Components

<u>Components</u>	<u>Make</u>
Fittings & tubing	Swagelok
Ball valve, Needle valve	Whitey
Check valve	Nupro
Pressure relief valve	Circle seal / Nupro
Solenoid valve	ASCO
Pressure gauge	Wika
For Non FLP components	As per the Standard codes
Electrical/ instrument components (FLP)	As per the Standard codes
Electrical Main Distribution Panel	Siemens / L&T

Vendor may recommend superior alternative makes for the items. However, the above may be adhered to as far as possible. Any other make will be subject to UPES approval.

### 3.0 Buffer storage between Electrolyzer & Compressor:1 No.

- |   |   |                               |
|---|---|-------------------------------|
| a) Capacity   | : | 1000 lit WC (approx)          |
| b) Storage pressure   | : | 10 bar (approx)               |
| c) MAWP   | : | 13.8 bar                      |
| d) Material   | : | As per International standard |
| e) Approval certificate   | : | PESO, Nagpur                  |
| f) Design compliance  | : | ASME section VIII Div 1:2007  |
| g) Vessel should be compatible with Hydrogen storage as per International practice. |   |                               |



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- h) Vessel should have pressure safety valve.
- i) Drain line valve should be of Swagelok make.
- j) Vessel should have suitable pressure gauges of WIKA make (suitable range).

### 4.0 Hydrogen Compressor (Oil Free): 1 No.

#### 4.1 TECHNICAL SPECIFICATION:

- a) Type : Triple Metallic Diaphragm with leak detection system, Non-Lubricating type
- b) Quantity : One No.
- c) Driver : FLP Motor suitable for Gas Group-IIC
- d) Single / Double Acting : Single
- e) Duty : Continuous
- f) Stage : Two

***Compressor should be capable of accepting delivered hydrogen from outside production facilities.***

#### 4.2 OPERATING CONDITIONS:

- a) Gas : Hydrogen
- b) Composition : Hydrogen - 99.999 %, Oil – Nil
- c) Relative Humidity : 90 % at max. temperature
- d) Suction Temperature : 0°C to 50°C
- e) Suction Pressure : Variable from 200 bar to 5 bar
- f) Capacity : 5 Nm<sup>3</sup> / hr at 5 bar suction pressure (min.)
- g) Discharge Pressure : 450 bar (minimum)
- h) Discharge Temp. (after cooler): 40 °C maximum
- i) Cylinder & Jacket cooling : By closed loop chillers (refer 2.1d of electrolyzer)
- j) Common Chiller for electrolyzer, compressor and other accessories.

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### **4.3 LUBRICATION SYSTEM**

Pressure lubrication with oil filter, oil pump, cooler and pre-lube hand operated pump etc. as per manufacturers standard.

### **4.4 HYDROGEN COMPRESSOR INSTRUMENTATION**

#### **4.4.1 Pressure Gauges:**

- a) Compressor Inlet
- b) Intermediate
- c) Gas Discharge final stage
- d) Oil header
- e) Coolant supply / return
- f) Diaphragm rupture detection system with shutdown mechanism

#### **4.4.2 Pressure Switches:**

Oil pressure low: 2 nos. One for pre alarm

#### **4.4.3 Temperature Gauges / Switches:**

- a) Compressor delivery, suction & intermediate
- b) Coolant in / out
- c) Coolant flow switch with trip arrangement

#### **4.4.4 Level Gauges:**

Oil circuit

#### **4.4.5 Other Instruments:**

- a) Secondary leak detection circuit
- b) PLC control to provide alarm indication and compressor status
- c) Junction Box
- d) Pressure relief valve in hydrogen circuit at all required points like suction, intermediate & discharge.

#### **4.4.6 Inspection & Testing**

- a) X-Ray examination for pressure vessels
- b) Test certificate for all instruments as per standard
- c) CMRS / PESO certificates of electrical & instrument components / equipments / motors etc.

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### **4.5 ELECTRICAL MOTOR FOR HYDROGEN COMPRESSOR**

#### **4.5.1 Technical Specification (PLC Controlled)**

- a) Duty : Continuous
- b) Control : PLC
- c) Reference ambient temp.: 50 °C for design
- d) Operating range : 0 - 50°C
- e) Equipment Location : Indoor
- f) Area Classification : Suitable for hydrogen atmosphere  
(Ref. IS: 5572)
- g) Temperature Classification: T-3, Hazardous Area Class: Type 'E'
- h) Power Supply System : 415 V  $\pm$  10%, 3 Phase, 50 Hz  $\pm$  3%

#### **4.5.2 Other Requirements**

- a) Enclosure service : TEFC, FLP, IP-55, Type 'E' for hydrogen,  
NFPA 496
- b) Insulation Class : F
- c) Codes : NFPA 70
- d) Motor should be flame proof and suitable for Gas Group IIC

### **5.0 High pressure storage after Compressor**

- a) Capacity : Total 1500 lit WC (split between  
2-3 vessels of smaller size)
- b) Storage pressure : 450 bar (minimum)
- c) MAWP : 500 bar
- d) Test pressure : 700 bar
- e) Material : As per International standard (SA 372,  
grade J, Class 70 vessel material)
- f) Approval certificate : PESO, Nagpur
- g) Design compliance : ASME boiler and pressure vessel code,  
Section VIII, Div 2:2007
- h) Storage system layout should conform to the Indian / International norms.
- i) Storage system should have pressure safety valve, pressure gauges etc.

### 6.0 Hydrogen Dispenser: 1 No.

The dispenser unit should be designed to supply hydrogen to vehicles. The dispenser should be equipped with a hose and nozzle to provide pure hydrogen at a pressure of 350 bar (max). Nozzle geometry should be compliant with SAE J2600 for H35 nozzle. The dispenser should be designed for fast filling of the vehicle storage tanks with a maximum flow rate of 1 kg /min. and minimum of 4 successive full fills.

For the safe operation of the unit, the dispenser should be equipped with hydrogen gas leak detector unit, break away hoses and nozzles, intrinsically safe electrical components and emergency stop buttons suitable for Gas Group IIC.

The system must consist of the following major components:

#### 6.1 Dispenser Specification:

- |                              |   |   |
|------------------------------|---|---|
| a) Working pressure          | : | 350 bar (maximum)   |
| b) Maximum flow rate         | : | ~ 1 kg / min  |
| c) Electrical requirement    | : | 220 VAC, 50 Hz  |
| d) Ambient temperature range | : | 0 - 50°C  |
| e) Nozzle compliance         | : | SAE J2600   |
| f) Pressure rating           | : | Mechanical components rated to 1000 bar. Hydrogen dispensing hose rated to 500 bar using a 6:1 safety factor  |
| g) Grounding provisions      | : | Grounding to be included with Communication cable, however, vehicles should be grounded via tires and concrete foundation.  |
| h) Code and Standards        |   | <ul style="list-style-type: none"><li>• NEC for Class 1, Division 2, Group B hazardous location.</li><li>• ASME B31.3, NFPA 52, NFPA 70, NFPA 55 codes.</li></ul> |

#### 6.2 Electronic computer and interface for dispenser with user-friendly controls

- a) Mass display (kg)
- b) Pressure display (bar)
- c) Price per unit display
- d) To provide step-by-step instruction similar to commercial gasoline dispensers.

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- e) Typical messages may be “Turn ignition off”, “Attach fuel hose” and “Fill complete”.
- f) PLC-based controls backed up with hard-wired shut downs for ultimate safety performance for the compressor and dispenser.
- g) Remote shut-off switch

### **6.3 Technical Features of Dispenser unit:**

- a) Equipped with stand-alone fill computer for temperature compensated fills.
- b) One Coriolis mass flow meter with internal transmitters for hydrogen.
  - The meter should totalize volume of gas dispensed.
  - The fill quantity should be data logged and displayed locally on the dispenser face for each fill.
  - The dispenser should meet or exceed applicable codes and standards.
- c) Electronic computer display, all displays should be backlit and intrinsically safe.
- d) Internal gas detection system that alarms at 20% LEL and 40% LEL.
  - At 20% LEL it should disable electrical power to dispenser & send a signal to an external alarm. A sounder and red flashing lamp mounted on the dispenser, should be triggered (NOTE: The sounder and flashing lamp should be intrinsically safe). An air or nitrogen purge should be activated at the 20% (LEL) level.
  - At 40% LEL the alarms should be the same as at 20% LEL with additional trigger to signal a station emergency shutdown.
- e) Hose leak detection system with automatic shutdown and alarm.
- f) Local and remote Emergency Stop switches that can be operated by the vehicle driver or others to stop the filling process.
- g) Manual fuel shutoff valve in close proximity to operator.
- h) Stainless steel piping fittings (Swagelok / Parker make) on pressure lines.
- i) Personal Identification Number capability to ensure only qualified operators can fill vehicles.
- j) Excess flow programming to interrupt the fill process if parameters leave established norms for fast fills.
- k) Telemetry capability for remote troubleshooting and data logging.
- l) Inlet valves should be pneumatically controlled.

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- m) Pressure relief valve should be there to protect the vehicles against overpressure. NOTE: This should be backup protection method, the electronic control system should serve as the primary means for controlling the filling pressure and preventing an overfill.
- n) Internal vent line should be combined with nozzle vent line. This line should be piped to base of dispenser for connection to vent line away from dispenser.
- o) Filters on dispenser hydrogen with coalescing element to remove oil, water and particulate
- p) Liquid filled, panel mounted pressure gauges for dispenser line pressure
- q) Delivery hose for 350 bar (max.) neat hydrogen filling.
- r) Nozzle holster for hydrogen nozzle.
- s) Breakaway system for pressure and vent line on hose.
- t) Twin-line delivery hose for hydrogen service.
- u) Ground cable reel mounted inside dispenser for additional vehicle grounding.
- v) Emergency shutdown button (intrinsically safe) mounted on dispenser cabinet.

### 6.4 Safety Features:

An emergency shutdown interface should be provided to react to a contact closure from local or remote emergency shutdown switches. Other fueling shutdown input signals include:

- a) Over pressure
- b) Drive-off
- c) Excessive flow
- d) Over temperature (including large temperature differential)
- e) Leak

Safety interlocks to be installed to address:

- a) Vehicle check valve failure
- b) Excess fill time
- c) Fuel supply initiated alarms / trips
- d) Minimum flow
- e) Flame scanners
- f) High supply pressure

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- g) Combustible gas sensors
- h) Fuel supply pressure failure
- i) Excess fuel flow rate
- j) Loss of control power

### **6.5 Accessories to be quoted as optional equipment for Dispenser**

Vibration switch mounted in dispenser.

## **7.0 INSTRUMENTATION AND CONTROL SYSTEM**

The control system wherever applicable should be PLC based and preferable make is Allen Bradley / Honeywell / Siemens. Details of the make and model of each component should be submitted. High-speed data transfer to the MMI PC should be possible. The 230 VAC supply will be provided at one point. The vendor should arrange for other internal distribution / supplies. Minimum 20% fully wired spare capacity should be available for maintenance purpose. The control panel should be designed as per proper industrial practice.

### **7.1 MMI & PLC SOFTWARE SPECIFICATION:**

The MMI / PLC software should be licensed to UPES name and should have following minimum features: -

### **7.2 MMI COMPUTER:**

- a) Latest Pentium Processor with authorized windows system
- b) 4 GB RAM(or advanced version), DVD-R/W Drive, Graphics card, 500 GB HD
- c) 19 "Color Monitor, Laser Black & White Printer – 2 nos.
- d) Preferred Makes are Lenovo, HP or Dell.

### **7.3 MMI SOFTWARE:**

- a) Software should be Windows based
- b) Plant control through graphics display
- c) Historical and real time trending
- d) Daily / hourly report generation
- e) Editing / modification capability for graphics and tag database
- f) Capability for calibration of process parameters

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### **7.4 PLC SOFTWARE:**

- a) PLC program downloading facility from backup
- b) Capability to modify the program logic
- c) PLC fault diagnosis facility

The application programs should be developed utilizing modular approach. It should be properly documented for better understanding and maintainability. Documentation should cover layout, electrical as built diagrams, service manuals for the bought-out components, configurations and service parameters etc. A copy of the back-up software(s) should be given with proper instructions for reloading in case of hard disk crash. PC should have integrated modem for long distance diagnostics

### **8.0 FACTORY ACCEPTANCE TEST (FAT): 5 days**

Objective of this test is to verify the equipment / instrument layout and other operating limits of the plant. The maximum and minimum limits of all the variables e.g. pressure, temperature, flow etc. will be checked during FAT. The computer software features, interlocks etc. will also be checked during FAT. UPES will nominate two executives for FAT and inform the vendor well in time.

### **9.0 SITE ACCEPTANCE TEST (SAT): 2 weeks**

All the instruments / equipment will be tested for functionalities as per the specification. Vendor will be fully responsible to replace all the damaged / malfunctioning instruments / equipment found during installation / commissioning / performance demonstration. If any component is found to be not performing to the desired level or causing any bottle neck to the overall trouble free operation / maintenance, vendor will provide suitable replacement without any additional cost.

### **10.0 TRAINING**

Vendor shall provide training in operation maintenance & trouble shooting of the electrolyzer, hydrogen compressor, hydrogen dispenser, Instruments and other support systems to the technical staff at the time of the system start up.

### **11.0 SPARE PARTS**

- a) The spare parts for comprehensive maintenance of the electrolyzer, hydrogen compressor, dispenser etc. should be included for 2 years and quoted separately with itemized prices.
- b) Special tools non-sparking type suitable for use in hydrogen plants should be supplied by the vendor.



### 12.0 POWER, WATER SUPPLY & AMBIENT CONDITIONS

The electrical supply to hydrogen dispensing station will be sourced through PV systems which will be supplemented through grid supply.

- a) Vendor should clearly indicate the power requirement (AC / DC) of the total station.
- b) Vendor to provide voltage and frequency range for continuous operations.
- c) The power supply available at site is 220 V  $\pm$  10 %, 50 Hz, 1  $\Phi$  and 415 V  $\pm$  10%, 50 Hz, 3  $\Phi$  with wide voltage variations for which static voltage regulator should be provided.
- d) The vendor should supply the equipment with soft start, such that the surge rating is as minimum as possible.
- e) The vendor should provide surge & continuous rating (for individual equipment and complete system), Voltage THD (Total Harmonic Distortion) from grid, Current THD drawn by load and kWh required per Kg of hydrogen.
- f) The power factor of the overall system should be at or greater than 0.8.
- g) UPES will provide power and raw water at one location. The interconnecting piping and cabling for power and raw water are in the scope of the vendor.
- h) All the equipment / components should have to be chosen / sized as per the ambient conditions. The ambient condition of the temperature as prevalent in Delhi is as given below

Ambient temperature (Min/Max)	: 0° C / 50° C
Relative Humidity	: 90 % max.
Altitude	: 225 m

### 13.0 INSTALLATION, TESTING & COMMISSIONING

This project has to be executed on total turnkey basis and vendor will execute installation, integration, testing and commissioning of all the equipment covered in the scope of supply. The cost of travel, boarding and lodging of vendor's engineers should be borne by vendor.

### 14.0 WARRANTY

The vendor shall guarantee that all materials and equipment used shall be in strict compliance with characteristics, requirements and specifications as per standard test procedures and the same shall be free from any defect. The vendor shall guarantee that all materials and equipment shall be repaired and replaced (as the case may be) on its own expense in case the same have been found to be defective within a period of 12 months after successful commissioning. The maintenance of the complete facility during warranty period will be the responsibility of the vendor.

## **15.0 MAINTENANCE OF COMPLETE SYSTEM FOR TWO YEARS AFTER WARRANTY PERIOD**

It is also the responsibility of the vendor to maintain the system for two years after warranty and the cost of the maintenance for two years should be quoted separately. The party shall be responsible for periodic maintenance as well as breakdown maintenance of the complete system. The spares required during this period will also be the responsibility of vendor.

## **16.0 PRICING**

The cost break-up of all major items i.e. electrolyzer, buffer storage, hydrogen compressor, high pressure storage, dispenser, electrical & instrumentation, FAT, SAT, Installation, testing and commissioning and two years maintenance charges with spares for complete system should be quoted in the price bid by the vendor.

## **17.0 VENDOR'S SCOPE**

- a) Vendor's scope will cover design, detailed engineering, procurement, fabrication, supply, installation, testing, commissioning and training as per the scheme and specifications given above.
- b) Vendor to provide details of layout scheme of the equipment, building design, foundation pipe, cable trenches etc. to UPES within one month after placement of purchase order. Vendor to provide design and drawings for civil modification works of the existing facility/ building etc. so as to conform to the specifications of hydrogen dispensing station. UPES will undertake the civil construction work as per the layout finalized by the vendor.
- c) All interconnection cables to be laid from main supply board, control panel etc. will be in the scope of vendor. Vendor's scope also covers the successful factory acceptance and site acceptance tests of the complete facility.
- d) All the necessary approvals from Petroleum Explosives & Safety Organization (PESO), Nagpur including HAZOP analysis for complete hydrogen dispensing station (wherever required) should be in the scope of vendor.

### **17.1 Special terms and conditions:**

- a) Vendor to offer a system capable of adopting future development / expansion in instrumentation and software development by the manufacturer. Minimum 20% spares capability shall be considered for all the system and sub systems.
- b) Vendor to furnish pre-installation requirements well in advance.
- c) Vendor to agree to supply spare parts for at least ten years from the date of installation in case the supplied model is discontinued.

## **ANNEXURE - I**

- d) Vendors to supply the names of their Indian agent, if any.
- e) Vendors should certify the competence of the Indian agent, if any, in respect of after sales service, technical knowhow etc.
- f) Vendor should certify that the system should have adequate in built protection devices against component failure due to electrical surges and voltage variations.
- g) Vendor should take full responsibility of satisfactory performance and after sales service of all the components of the system irrespective of the makes.

### **17.2 Additional points for the vendors:**

- a) All the electrical components used in the unit or in the control cabinet should be of reputed company. The vendor shall provide an exhaustive list of components/ equipment along with their makes for UPES approval prior to procurement.
- b) An appropriate lighting system shall be designed and provided for the station.
- c) During onsite installation, unpacking of crates, placing of the unit at desired location etc. is in the scope of the vendor.
- d) All the equipment / components / instruments etc. required for meeting the performance of the station but not specifically mentioned above should be in the scope of the vendor.
- e) All flow meters should be provided with bypass line with isolation valves.

## **18.0 DOCUMENTATION**

Four sets of following documents (hardcopy, English) must be provided by the vendor along with the equipment beside their soft copies in CDs.

- a) Operating manual
- b) Detailed maintenance / service manual
- c) P&ID diagram – to be provided at the time of PESO clearance / approval for the station.
- d) Electrical cabling / instrumentation wiring diagram
- e) Detailed bill of material.
- f) List of places similar plant has been supplied earlier.
- g) Required site dimensions and layout – To be provided at the time of PESO clearance / approval of the station.
- h) Manufacturers test reports
- i) Warranty certificate
- j) U/L mark certificate (Underwriters Laboratories Inc.) wherever applicable should be provided at the time of PESO clearance / approval of the station.

## **ANNEXURE - I**

### **19.0 TIME SCHEDULE**

The Hydrogen Dispensing Station should be supplied within six months after acceptance of purchase order. The installation and commissioning has to be completed within three months of receipt of consignment at Solar Energy Centre, Gwal Pahari and site readiness.

### **20.0 UPES scope of work:**

- a) UPES will provide storage space for safe keeping of all materials during the construction period.
- b) UPES will provide electricity for construction.
- c) The civil work for the station will be undertaken by UPES.

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#### **The tender should be addressed to:**

THE MANAGER- PROCUREMENT/ DR. A. K. TIWARI (SR. PRINCIPAL SCIENTIST)  
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES  
HERS, 3<sup>RD</sup> FLOOR, PHD CHAMBER,  
4/2, SIRI INSTITUTIONAL AREA  
AUGUST KRANTI MARG  
NEW DELHI-110016  
INDIA

Ph: +91-11-41730151-53  
Fax: +91-11-41730154  
E-mail: aktiwari@upes.ac.in

## ANNEXURE -II

(AGREED TERMS AND CONDITIONS TO BE ATTACHED WITH UNPRICED SETS OF OFFERS EACH POINT MUST BE COMMENTED UPON)

SR. NO.	Description	COMMENT/YES/NO
1.	<b>Please confirm that</b> the firm price on the FCA/ FOB International Airport basis in the country of dispatch is mentioned in price bid.	
2.	<b>Please also indicate separately,</b> the Airfreight Charges from the FCA/ FOB Airport of dispatch to New Delhi Airport in India and Sea freight from origin to Bombay Port.	
3.	<b>Confirm unconditionally that</b> the quoted price for the main equipment, accessories & spares etc. are valid for the acceptance up to six months from the closing date of this enquiry.	
4.	<b>Please indicate the earliest FIRM period of Delivery</b> of goods at FOB/FCA point of shipment from the date of receipt of Letter of Credit.	
5.	<b>Please indicate the minimum but FIRM period of completing UPES – on –site activities of</b> installation, commissioning & training (inclusive of time required for visa, travel time as well as time required at the site for completion of installation, commissioning & training) after receipt of officials notification from UPES regarding arrival of goods at site and site readiness.	
6.	<b>Please confirm unconditionally that</b> in case of any delays on the part of the vendor or any one authorized by the vendor either in shipment or on site activities beyond the above stipulated periods, the price reduction clause as per the UPES norms will be applicable @ ½% of the total value of the order ( <b>supply + on site activities value</b> ) per week of such delay or part thereof subject to maximum 5% of such total order value.	
7.	<b>Please confirm whether</b> the UPES - on site activities of installation, commissioning and training will be provided directly by you or by any of your authorized representative.	
8.	<b>If by your any authorized representative:</b> 1. <b>Please confirm</b> that the same will be carried out by them FREE of CHARGE. 2. <b>Indicate</b> the complete name, address, phone no., fax no., e- mail address and contact person's details.	

## ANNEXURE -II

	<p>3. Please <b>ask</b> your representative to confirm the same in writing directly to UPES.</p> <p>4. <b>Confirm that</b> that the overall responsibility for completion of these on site activities will also be yours and in case of failure on the part of your Indian Representative to complete these activities, the same will be carried out by you without any additional financial liability to UPES (Free of Charge) by deputing your representative from abroad.</p> <p>5. <b>Confirm that</b> any commitments made by your Indian Representative during the period of onsite activities will be binding on you.</p>	
9.	<b>Indicate</b> the Country of origin of goods offered.	
10.	<b>Confirm unconditionally that</b> the quoted prices are in the currency of country of origin of goods.	
11.	Confirm unconditionally that discount (if any) indicated by you in your priced bid is NOT on Lump sum value basis but is indicated only on percentage basis against each such quoted price. <b>This is essentially required to be complied with because UPES reserves the right to select any / all items of your quotation for the purpose of ordering.</b> (It may please be noted that in case it is observed after opening the priced bid that you have quoted Lump sum discount and UPES do not intend to procure all items quoted by you, UPES will be at liberty to spread the total discount on pro rata basis on the total value of the quotation to derive the discount on percentage basis for each item price).	
12.	<b>Confirm that</b> Complete technical literature / catalogues etc. have been enclosed with your unpriced bid.	
13.	<b>Please indicate the total number of packages,</b> which will be required to be shipped in case of an order for the complete scope quoted by you.	
14.	<b>With respect to (13) above, please also indicate</b> the approximate gross weight & shipping dimensions of each such package.	
15.	<b>Confirm unconditionally that</b> in case of an order emerging out of this tender in your favor within your offer validity, the quoted prices shall remain firm and fixed till completion of order, without any escalation on any account, whatsoever.	
16.	<b>Confirm unconditional acceptance of</b> comprehensive warranty {inclusive of absolutely free of charge delivery at our site and installation of replacement parts / spares and maintenance of the complete system free of all expenses} for a period of clear 12 months from the date of satisfactory	

## ANNEXURE -II

	completion of onsite installation, commissioning at our location.	
17.	<b>Confirm unconditionally acceptance of</b> extended warranty of 2 years after the warranty period including the periodic and breakdown comprehensive maintenance for which the maintenance cost has to be quoted in cost breakdown.	
18.	<b>Confirm that</b> the vendor has provided an exhaustive list of Spare Parts & Consumables (with unit rate of each item of spares & consumables quoted) that may be required for smooth working of the equipment for a period of at least 02 years (Extended warranty period) after the standard warranty period of 12 months from the date of commissioning.	
19.	<b>Confirm clearly whether</b> you have quoted the cost break-up of all major items i.e. electrolyzer, buffer storage, hydrogen compressor, high pressure storage, dispenser, electrical & instrumentation, FAT, SAT, Installation, testing and commissioning.	
20.	<b>If yes, to (19) above, please confirm unconditionally that</b> such quoted charges for onsite activities are inclusive of all your expenses related to this activity (such as travel, boarding, lodging, transport or any other expected expense) on Lump sum basis.	
21.	<p><b>Confirm unconditional acceptance of 2 separate orders from UPES as under with terms of payment indicated against each order:</b></p> <p><b><u>For Supply Order:</u></b> 90% payment through unconfirmed but irrevocable letter of credit against shipping documents and balance 10% after satisfactory completion of site activities of installation, commissioning and training on cash against documents through bank basis subject to our receiving the performance bank guarantee for 10% of order value to be valid for the warranty period.</p> <p><b><u>For Site Activities Order:</u></b> 100% of the order value (minus statutory deductions on account of Income tax and Service Tax etc. as per Govt. of India regulations in force) only after satisfactory completion of site activities of installation, commissioning and training on cash against documents through bank basis subject to our receiving a separate performance bank guarantee for 10% of the value of this order to be valid for the warranty period.</p>	
22.	All bank charges and stamp duties payable outside India in connection with payment to be made under this purchase order shall be borne by the supplier. All Bank Charges and stamp duties payable in India shall be borne by the	

## ANNEXURE -II

	purchaser. <b>Confirm unconditional acceptance</b>	
23.	All taxes, duties and levies of any kind payable up to FCA / FOB port of shipment shall be borne by the supplier. <b>Confirm unconditional acceptance</b>	
24.	<p><b>Direct offer without the Intermediary of Indian Agent only will be considered. However, if the foreign supplier has an Indian agent or associate, the following information may be furnished.</b></p> <p><b>i) Please indicate</b> the commission payable to Indian agents if any in terms of <b>DGS&amp;D</b> registration certificate (enclose the copy of the valid DGS&amp;D registration certificate) in % of the total FOB / Ex-Works order value.</p> <p><b>ii) Confirm acceptance that</b> the payment for commission to be paid to Indian agent shall be made in Indian Rupees only which would not be subject to variation on account of exchange rates.</p> <p><b>iii) Confirm unconditional acceptance</b> that any / all communications received by UPES from your said Indian Agent / representative will be fully binding on you and will be honored by you without any dispute.</p> <p><b>iv) Please furnish the following information in</b> respect of your said Indian agents / Associates / Representative.</p> <p>a) The precise relationship between the foreign manufacturers / Principal bidders and their Indian agents / Associate/ Representative.</p> <p>b) The mutual interest which the manufacturer/principal and the Indian agents / Associates have in the business of each other.</p> <p>c) Any payment which the Agent / Associate receive in India or aboard from the manufacturer / principal whether as a commission for the contract or as a general retainer fee.</p> <p>d) Indian Agent's Income Tax permanent Account Number.</p> <p>e) All Service to be rendered by the Agent/Associate whether of general nature or in relation to the particular contract.</p>	



## ANNEXURE -II

	<p>f) Confirmation that the Indian Agent is registered with DGS &amp; D and a copy of their valid registration is enclosed.</p> <p>g) Acceptance that the Agent commission shall be paid in Indian Rupees only after receipt of materials and satisfactory installation / commissioning of the equipment at site subject to fulfilling all conditions above.</p> <p>Note: tenders which do not comply with above stipulations are liable to be ignored.</p>	
25.	<b>Please indicate the name &amp; address of your Bankers with your Account Number, SWIFT Code</b> for the purpose of payments / Letter of credit.	
26.	<b>Confirmation that</b> you do not have any relationship with any of our Board members or Employees.	
27.	<b>Confirmation that</b> you shall supply Maintenance manual complete, with circuit diagram, component layout with Diagnostic package for testing and evaluating the operational conditions and key electronic parts or assembly on individual or isolated basis, with the equipment FREE OF COST.	
28.	<b>Confirmation to</b> assume responsibility of satisfactory performance & after sales service of all the components of the system irrespective of make within the warranty period.	
29.	<b>Please also confirm that</b> spare parts will be made available as & when required for a minimum period of 10 years from the date of successful completion of warranty period. The price of the spare parts to be quoted separately for this.	
30.	<b>Confirmation that</b> system has adequate in built protection device against component failure due to electrical surges.	
31.	<b>Confirm that</b> in case of an order, the pre installation requirement will be provided by you within a period of maximum 1 month from the date of receipt of order.	
32.	<b>Confirm unconditionally that</b> separate prices quoted for site activities are inclusive of Income tax and / or Service tax payable in India on such site services and also the statutory deductions of Income Tax and/or Service Tax from the payment will be as per Govt. of India Regulations in force from time to time will be acceptable to you.	

## ANNEXURE -II

### ADDITIONAL INFORMATION / CONFIRMATION REQUIRED TO BE FURNISHED BY THE VENDOR

a)	<p>Confirm that you are submitting the Earnest Money Deposit (EMD) 5% of the total order value. If yes, kindly indicate</p> <p>a) Mode of EMD whether Demand Draft (on the name of “University of Petroleum and Energy Studies”) / or Bank Guarantee payable at New Delhi.</p> <p>b) Demand Draft No. / Bank Guarantee No &amp; date.</p> <p>c) Amount of EMD.</p> <p>d) Issuing Bank.</p>	
b)	<p>Following information / confirmation may be furnished in case the items are being quoted in Indian Rupees and to be supplied locally.</p> <ol style="list-style-type: none"><li>1. Suppliers Name &amp; complete address</li><li>2. Manufacturers name &amp; complete address</li><li>3. Telephone No./Fax No. / E-mail address</li><li>4. Price basis (whether excise / FOR dispatch point or FOR destination)</li><li>5. Discount offered if any</li><li>6. Packing &amp; Forwarding charge if any</li><li>7. Excise Duty if applicable</li><li>8. CST (Concessional rate / full rate)</li><li>9. Freight Charges</li><li>10. Transit Insurance</li><li>11. Delivery Period</li><li>12. Payment Terms</li><li>13. Any Other Conditions</li></ol>	
c)	<p>Confirm whether a repeat order within 6 months of original order date for the same quantity, rate and terms and conditions shall be acceptable to you (applicable to both foreign offer as well as indigenous offer) .</p>	

## ANNEXURE -II

Signature .....  
Name .....  
Designation .....

(OFFICE STAMP) .....

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